

**Listing of the Claims:**

The following is a complete listing of all the claims in the application, with an indication of the status of each:

1        Claims 1-14 (Canceled).

1        Claim 15 (Currently Amended) A magneto-resistance effect element  
2        comprising:  
3            a lower conductive layer;  
4            a fixed layer provided on the lower conductive layer and having a  
5        pinned orientation of magnetization;  
6            a first non-magnetic layer provided on the fixed layer;  
7            a free layer provided on the first non-magnetic layer and having an  
8        orientation of magnetization varied by a magnetic field applied thereto;  
9            a first magnetic layer provided on the free layer and magnetically  
10       coupled to the free layer;  
11           a second magnetic layer provided on the first magnetic layer and  
12       magnetically coupled to the first magnetic layer;  
13           a third non-magnetic layer between said first magnetic layer and  
14       said second magnetic layer; and  
15           a vertical bias layer for applying a magnetic field to said first and  
16       second magnetic layers, and a sense current for detecting a change in  
17       electrical resistance of said first non-magnetic layer flows substantially in  
18       perpendicular relation to said first non-magnetic layer.

1        Claim 16 (Original). The magneto-resistance effect element according to  
2        claim 15, wherein said first magnetic layer is equal to or greater than said  
3        free layer in length in the direction of the magnetic field applied by said  
4        vertical bias layer.

1 Claim 17 (Original). The magneto-resistance effect element according to  
2 claim 15, wherein said second magnetic layer is equal to or greater than  
3 said free layer in length in the direction of the magnetic field applied by  
4 said vertical bias layer.

1 Claim 18 (Original). The magneto-resistance effect element according to  
2 claim 15, further comprising a fixing layer, disposed between said lower  
3 conductive layer and said fixed layer, for pinning the orientation of  
4 magnetization of said fixed layer.

1 Claim 19 (Original). The magneto-resistance effect element according to  
2 claim 15, further comprising a second non-magnetic layer between said  
3 free layer and said first magnetic layer.

1 Claim 20 (Canceled).

1 Claim 21 (Original). The magneto-resistance effect element according to  
2 claim 15, wherein said free layer is magnetically coupled to said first  
3 magnetic layer by anti-ferromagnetic coupling or ferromagnetic coupling.

1 Claim 22 (Original). The magneto-resistance effect element according to  
2 claim 15, wherein said first magnetic layer is magnetically coupled to said  
3 second magnetic layer by anti-ferromagnetic coupling or ferromagnetic  
4 coupling.

1 Claim 23 (Original). The magneto-resistance effect element according to  
2 claim 15, wherein the product of saturation magnetization and film  
3 thickness of said first magnetic layer is substantially equal to the product  
4 of saturation magnetization and film thickness of said second magnetic  
5 layer.

1 Claim 24 (Currently Amended). The magneto-resistance effect element  
2 according to claim ~~20~~ 15, wherein a three-layered film made up of said  
3 first magnetic layer, said third non-magnetic layer, and said second  
4 magnetic layer is a layered antiferromagnetic body.

1 Claim 25 (Withdrawn). The magneto-resistance effect element according  
2 to claim 15, wherein at least part of said first magnetic layer is in direct  
3 contact with said vertical bias layer.

1 Claim 26 (Original). The magneto-resistance effect element according to  
2 claim 15, wherein at least part of said second magnetic layer is in direct  
3 contact with said vertical bias layer.

1 Claim 27 (Withdrawn). A magneto-resistance effect element comprising:  
2 a lower conductive layer;  
3 a fixed layer provided on the lower conductive layer and having a  
4 pinned orientation of magnetization;  
5 a non-magnetic layer provided on the fixed layer;  
6 a free layer provided on the non-magnetic layer and having an  
7 orientation of magnetization varied by a magnetic field applied thereto;  
8 a magnetic layer provided on the free layer; and  
9 a vertical bias layer, provided on the magnetic layer, for applying a  
10 magnetic field to said magnetic layer, and a sense current for detecting a  
11 change in electrical resistance of said non-magnetic layer flows  
12 substantially in perpendicular relation to said non-magnetic layer.

1 Claim 28 (Withdrawn). The magneto-resistance effect element according  
2 to claim 27, further comprising a second magnetic layer between said  
3 magnetic layer and said vertical bias layer.

1 Claim 29 (Withdrawn). A magneto-resistance effect element comprising:  
2 a lower conductive layer;  
3 a first fixed layer provided on the lower conductive layer and  
4 having a pinned orientation of magnetization;  
5 a first non-magnetic layer provided on the first fixed layer;  
6 a first free layer provided on the first non-magnetic layer and  
7 having an orientation of magnetization varied by a magnetic field applied  
8 thereto;  
9 a magnetic layer provided on the first free layer and magnetically  
10 coupled to the first free layer;  
11 a second free layer provided on the magnetic layer and  
12 magnetically coupled to the magnetic layer;  
13 a second non-magnetic layer provided on the second free layer;  
14 a second fixed layer provided on the second non-magnetic layer  
15 and having a pinned orientation of magnetization; and  
16 a vertical bias layer for applying a magnetic field to said magnetic  
17 layer, and a sense current for detecting a change in electrical resistance of  
18 said first and second non-magnetic layers flows substantially in  
19 perpendicular relation to said first and second non-magnetic layers.

1 Claim 30 (Withdrawn). The magneto-resistance effect element according  
2 to claim 29, wherein said magnetic layer is equal to or greater than said  
3 first and second free layers in length in the direction of the magnetic field  
4 applied by said vertical bias layer.

1 Claim 31 (Withdrawn). The magneto-resistance effect element according  
2 to claim 29, further comprising a first fixing layer, disposed below said  
3 first fixed layer, for pinning the orientation of magnetization of said first  
4 fixed layer.

1        Claim 32 (Withdrawn). The magneto-resistance effect element according  
2        to claim 29, further comprising a second fixing layer, disposed above said  
3        second fixed layer, for pinning the orientation of magnetization of said  
4        second fixed layer.

1        Claim 33 (Withdrawn). The magneto-resistance effect element according  
2        to claim 29, wherein said first free layer is magnetically coupled to said  
3        magnetic layer by anti-ferromagnetic coupling or ferromagnetic coupling.

1        Claim 34 (Withdrawn). The magneto-resistance effect element according  
2        to claim 29, wherein said magnetic layer is magnetically coupled to said  
3        second free layer by anti-ferromagnetic coupling or ferromagnetic  
4        coupling.

1        Claim 35 (Withdrawn). The magneto-resistance effect element according  
2        to claim 29, wherein at least part of said magnetic layer is in direct contact  
3        with said vertical bias layer.

4        Claim 36 (Withdrawn). A magneto-resistance effect element comprising:  
5                a lower conductive layer;  
6                a first magnetic layer provided on the lower electrically conductive;  
7                a second magnetic layer provided on the first magnetic layer and  
8        magnetically coupled to the first magnetic layer;  
9                a free layer provided on the second magnetic layer, magnetically  
10        coupled to the second magnetic layer, and having an orientation of  
11        magnetization varied by a magnetic field applied thereto;  
12                a first non-magnetic layer provided on the free layer ;  
13                a fixed layer provided on the first non-magnetic layer and having a  
14        pinned orientation of magnetization; and  
15                a vertical bias layer for applying a magnetic field to said first

16 magnetic layer, and a sense current for detecting a change in electrical  
17 resistance of said first non-magnetic layer flows substantially in  
18 perpendicular relation to said first non-magnetic layer.

1 Claim 37 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, wherein said first magnetic layer is equal to or greater than  
3 said free layer in length in the direction of the magnetic field applied by  
4 said vertical bias layer.

1 Claim 38 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, wherein said second magnetic layer is equal to or greater than  
3 said free layer in length in the direction of the magnetic field applied by  
4 said vertical bias layer.

1 Claim 39 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, further comprising a fixing layer, disposed on said fixed layer,  
3 for pinning the orientation of magnetization of said fixed layer.

1 Claim 40 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, further comprising a second non-magnetic layer between said  
3 first magnetic layer and said second magnetic layer.

1 Claim 41 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, further comprising a third non-magnetic layer between said  
3 second magnetic layer and said free layer.

1 Claim 42 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, wherein said free layer is magnetically coupled to said second  
3 magnetic layer by anti-ferromagnetic coupling or ferromagnetic coupling.

1 Claim 43 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, wherein said first magnetic layer is magnetically coupled to  
3 said second magnetic layer by anti-ferromagnetic coupling or  
4 ferromagnetic coupling.

1 Claim 44 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, wherein the product of saturation magnetization and film  
3 thickness of said first magnetic layer is substantially equal to the product  
4 of saturation magnetization and film thickness of said second magnetic  
5 layer.

1 Claim 45 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, wherein a three-layered film made up of said first magnetic  
3 layer, said second non-magnetic layer, and said second magnetic layer is a  
4 layered antiferromagnetic body.

1 Claim 46 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, wherein at least part of said first magnetic layer is in direct  
3 contact with said vertical bias layer.

1 Claim 47 (Withdrawn). The magneto-resistance effect element according  
2 to claim 36, wherein at least part of said second magnetic layer is in direct  
3 contact with said vertical bias layer.

1 Claim 48 (withdrawn). A magneto-resistance effect element comprising:  
2 a lower conductive layer;  
3 a vertical bias layer provided on the lower conductive layer;  
4 a first magnetic layer provided on the vertical bias layer;  
5 a second magnetic layer provided on the first magnetic layer and  
6 magnetically coupled to the first magnetic layer;

7           a free layer provided on the second magnetic layer, magnetically  
8   coupled to the second magnetic layer, and having an orientation of  
9   magnetization varied by a magnetic field applied thereto;  
10          a first non-magnetic layer provided on the free layer; and  
11          a fixed layer provided on the first non-magnetic layer and having a  
12   pinned orientation of magnetization, and a sense current for detecting a  
13   change in electrical resistance of said first non-magnetic layer flows  
14   substantially in perpendicular relation to said first non-magnetic layer.

1    Claim 49 (Withdrawn). The magneto-resistance effect element according  
2    to claim 48, wherein said first magnetic layer is equal to or greater than  
3    said free layer in length in the direction of the magnetic field applied by  
4    said vertical bias layer.

1    Claim 50 (Withdrawn). The magneto-resistance effect element according  
2    to claim 48, wherein said second magnetic layer is equal to or greater than  
3    said free layer in length in the direction of the magnetic field applied by  
4    said vertical bias layer.

1    Claim 51 (Withdrawn). The magneto-resistance effect element according  
2    to claim 48, further comprising a second non-magnetic layer between said  
3    first magnetic layer and said second magnetic layer.

1    Claim 52 (Withdrawn). The magneto-resistance effect element according  
2    to claim 48, further comprising a third non-magnetic layer between said  
3    second magnetic layer and said free layer.

1    Claim 53 (Withdrawn). The magneto-resistance effect element according  
2    to claim 48, wherein said free layer is magnetically coupled to said second  
3    magnetic layer by anti-ferromagnetic coupling or ferromagnetic coupling.



1 Claim 54 (Withdrawn). The magneto-resistance effect element according  
2 to claim 48, wherein said first magnetic layer is magnetically coupled to  
3 said second magnetic layer by anti-ferromagnetic coupling or  
4 ferromagnetic coupling.

1 Claim 55 (Withdrawn). The magneto-resistance effect element according  
2 to claim 48, wherein the product of saturation magnetization and film  
3 thickness of said first magnetic layer is substantially equal to the product  
4 of saturation magnetization and film thickness of said second magnetic  
5 layer.

1 Claim 56 (Withdrawn). The magneto-resistance effect element according  
2 to claim 48, wherein a three-layered film made up of said first magnetic  
3 layer, said second non-magnetic layer, and said second magnetic layer is a  
4 layered antiferromagnetic body.

1 Claim 57 (Withdrawn). The magneto-resistance effect element according  
2 to claim 48, wherein at least part of said first magnetic layer is in direct  
3 contact with said vertical bias layer.

1 Claim 58 (Withdrawn). The magneto-resistance effect element according  
2 to claim 48, wherein at least part of said second magnetic layer is in direct  
3 contact with said vertical bias layer.

1 Claim 59 (Withdrawn). A magneto-resistance effect head comprising:  
2 said magneto-resistance effect element including  
3 a lower conductive layer, a free layer provided on the lower conductive  
4 layer and having an orientation of magnetization varied by a magnetic field  
5 applied thereto, a non-magnetic layer provided on top of the free layer, a  
6 fixed layer provided on the non-magnetic layer and having a pinned

7 orientation of magnetization, and a vertical bias layer, provided on said  
8 lower conductive layer, for applying a magnetic field to said free layer, and  
9 said free layer is greater in length in the direction of a magnetic field  
10 applied thereto by said vertical bias layer than said fixed layer, and a sense  
11 current for detecting a change in electrical resistance of said non-magnetic  
12 layer flows substantially in perpendicular relation to said non-magnetic  
13 layer;

14 a lower shield layer serving as a substrate for said magneto-  
15 resistance effect element;

16 an upper conductive layer, provided on said magneto-resistance  
17 effect element, for inputting a sense current for detecting a change in  
18 electrical resistance of said magneto-resistance effect element into said  
19 magneto-resistance effect element; and

20 an upper shield layer provided on the upper conductive layer.

1 Claim 60 (Withdrawn). The magneto-resistance effect head according to  
2 claim 59, wherein the lower conductive layer of said magneto-resistance  
3 effect element is integrated with said lower shield layer.

1 Claim 61 (Withdrawn). The magneto-resistance effect head according to  
2 claim 59, wherein said upper conductive layer is integrated with said upper  
3 shield layer.

1 Claim 62 (Withdrawn). A magneto-resistance transducer system  
2 comprising:  
3 said magneto-resistance effect head according to claim 59;  
4 an electric current generator circuit for supplying a sense current to  
5 said magneto-resistance effect head; and

6           a data read circuit for detecting a change in electrical resistance of  
7       said magneto-resistance effect head to determine a magnetic field applied  
8       to said magneto-resistance effect head.

1       Claim 63 (Withdrawn). A magnetic storage system comprising:  
2           said magneto-resistance transducer system according to claim 62;  
3           a magnetic storage medium having a plurality of tracks for  
4       allowing said magneto-resistance transducer system to write and read data  
5       thereon;  
6           a first actuator for moving said magneto-resistance transducer  
7       system to where a selected track is located in said magnetic storage  
8       medium; and  
9           a second actuator for rotatably driving said track.